Author Index

BARTLETT, J. T. *See* HUNT, G. E.

BORNMAN, C. H. and BOTHA, C. E. J. The role of aphids in research. 129.

BOTHA, C. E. J. *See* BORNMAN, C. H.

CABORN, J. M. Microclimates. 30.

DILLY, P. N. The enigma of colouration and light emission in deep-sea animals. 25.

DUPOUY, G. Three-megavolt electron microscopy. 66.

EDITORIAL
- A publishing centenary: *Journal of Experimental and Theoretical Physics*. 2.
- Realization of the EMB laboratory. 98.
- Research and the law of the sea. 50.

EMELÉUS, H. J. Sulphur-nitrogen compounds. 76.

GANS, C. Uropeltid snakes—survivors in a changing world. 60.

GARRETT, R. A. and WITTMANN, H.-G. Structure and function of the ribosome. 8.

GILLESPIE, R. J. The chemistry of superacid systems. 3.

GOTTESFELD, Z. *See* SAMUEL, D.

HERIVEL, J. Thomas Young (1773–1829). 15.

HEYMANN, F. F. The intersecting storage rings of CERN. 81.

HOSEMANN, R. Paracrystals in biopolymers and synthetic polymers. 99.

HUNT, G. E. and BARTLETT, J. T. The lower Venus atmosphere. 39.

KIRTON, J. and RAYNES, E. P. Electro-optic effects in liquid crystals. 71.

MCCAPRA, F. The chemistry of bioluminescence. 139.

MARTIN-KAYE, P. H. A. *See* MORRIS, D. B.

MASSEY, SIR HARRIE. Neutrinos. 86.

MORRIS, D. B. and MARTIN-KAYE, P. H. A. Remote sensing of the environment. 117.

NIXON, J. F. Tervalent phosphorus fluorides and their coordination complexes. 19.

PLEASANTS, J. R. Germfree animals and their significance. 112.

RAVETZ, J. R. Copernicus and his Long Revolution. 57.

RAYNES, E. P. *See* KIRTON, J.

SAMUEL, D. and GOTTESFELD, Z. Lithium, manic-depression and the chemistry of the brain. 122.

SIEGBAHN, K. Electron spectroscopy—a new way of looking into matter. 51.

SUESS, H. E. Natural radiocarbon. 34.

WILLIS, J. B. Recent advances in the analysis of biological materials by atomic absorption techniques. 106.

WINTER, H. J. J. Mediaeval transmissions of science. 134.

WITTMANN, H.-G. *See* GARRETT, R. A.

Subject Index

Astronomy

The lower Venus atmosphere. Hunt, G. E. and Bartlett, J. T. 39.

Physics

A publishing centenary: *Journal of Experimental and Theoretical Physics* (Editorial). 2.

Neutrinos. Massey, Sir Harrie. 86.

Electro-optic effects in liquid crystals. Kirton, J. and Raynes, E. P. 71.

Paracrystals in biopolymers and synthetic polymers. R. Hosemann. 99.

Chemistry

Recent advances in the analysis of biological materials by atomic absorption techniques. Willis, J. B. 106.

Electron spectroscopy—a new way of looking into matter. Siegbahn, K. 51.

The chemistry of superacid systems. Gillespie, R. J. 3.

Sulphur-nitrogen compounds. Emeléus, H. J. 76.

Tervalent phosphorus fluorides and their coordination complexes. Nixon, J. F. 19.

Natural radiocarbon. Suess, H. E. 34.

The chemistry of bioluminescence. McCapra, F. 139.

Geophysics. Geology

Research and the law of the sea (Editorial). 50.

Microclimates. Caborn, J. M. 30.

Remote sensing of the environment. Morris, D. B. and Martin-Kaye, P. H. A. 117.

General Biology

Realization of the EMB laboratory. 98.

Structure and function of the ribosome. Garrett, R. A. and Wittmann, H.-G. 8.

Germfree animals and their significance. Pleasants, J. R. 112.

Botany

The role of aphids in phloem research. Bornman, C. H. and Botha, C. E. J. 129.

Zoology

The enigma of colouration and light emission in deep-sea animals. Dilly, P. N. 25.

Uropeltid snakes—survivors in a changing world. Gans, C. 60.

Medicine

Lithium, manic-depression, and the chemistry of the brain. Samuel, D. and Gottesfeld, Z. 122.

Nuclear and Electrical Engineering

Three-megavolt electron microscopy. Dupouy, G. 66.

The intersecting storage rings of CERN. Heymann, F. F. 81.

History of Science

Mediaeval transmissions of science. Winter, H. J. J. 134.

Copernicus and his Long Revolution. Ravetz, J. R. 57.

Thomas Young (1773–1829). Herivel, J. 15.

a landmark in the recorded history of the computer, and serve as a necessary reference for any student, whether of science or sociology, who wishes to trace the origin and development of the fundamental ideas which have produced the computer age.

The book falls into three parts. Part I, about one-third of the book, deals with a number of historical items up to the start of World War II. The reader catches a glimpse of the life of such people as Galileo, Pascal, and Leibniz, and is then introduced to a chapter on Babbage. Later, there is an account of Maxwell, Boole, Michelson, Gibbs, Hollerith, and Bush, together with their work, especially in relation to instruments invented to carry out various calculations.

In Part II we have an account of the accelerated activity during the war. This is the period of Von Neumann's deep involvement, with the author and others, in the development of computers and computing. It led to the emergence of ENIAC and EDVAC. The story of the development of these machines is highly fascinating, depending, as it did, on so many fortuitous combinations of circumstance—for example, the right people with the right backgrounds coming together at the right time.

Part III deals with post-war developments, especially at the Institute for Advanced Study at Princeton. There are chapters on automata theory, logic machines, and the impact of the computer on mathematics and meteorology. There is also an important chapter outlining the historical development of programming languages.

In retrospect, after reading this book, one is filled with a sense of the mighty onrush of the science and technology that produced the computer. But the surge and momentum have now largely passed. Instead, mankind is now faced with the social task of adapting to the computer age; and, as the author remarks: 'jurists, legislators and sociologists will have to come to terms with these changes . . . in constructive ways, so that our life can avoid potential disadvantages and take full advantage of the benefits of computerization.'

L. S. Goddard

INDUSTRIAL HISTORY

Tennant's Stalk: The Story of the Tennants of the Glen, ***by Nancy Crathorne (completed by Katharine Elliot of Harwood, and James Dugdale). Pp xviii+256. Macmillan Ltd., London. 1973. £4·95.***

This book is by two daughters and a grandson of Sir Charles Tennant (1823–1906) of Glasgow, who has been described by Professor S. G. Checkland as 'the high Victorian *entrepreneur*.' It is a testimonial, of which Dr Samuel Smiles would highly have approved, to the classic virtues of capitalism: self-help, hard work, inventiveness, daring and a very shrewd eye for the main chance, whether that lay in bleaching powder for the booming cotton trade of the early nineteenth century, in railways of George Stephenson's day, in Nobel's dynamite about 1870, or in gold-mines in Mysore, paying dividends which ran as high as 165 per cent, in 1903.

Five generations' practice of these admirable qualities carried the prolific Tennants from the harsh penury of eighteenth century rural Scotland to dashing and unorthodox leadership of London Society (the capital S is important) in its lushest late Victorian opulence. Victorian Glasgow, a rival to the City of London as a commercial and financial centre, was the scene of the Tennants' business triumphs: their leading champion was Sir Charles. Tiny, elegant, fiery, immensely vigorous (he fathered four children, out of sixteen altogether, after he was 75), he is the hero of this book. His forebears and his daughters, especially Margot, are the leading players in a supporting cast, it sometimes seems, of thousands, with Robert Burns as guest star and honorary Tennant.

The book makes no claim to profound historical scholarship, but the vigour and pace of the writing make it an engaging exercise in social comment, group biography, and family piety. *W. J. Reader*

SZILARD'S WORKS

The Collected Works of Leo Szilard, Scientific Papers. ***Edited by Bernard Feld and Gertrude Szilard. Pp xxii+737. MIT Press. $17.50***

Most 'Collected Works' of eminent scientists are almost totally useless to the next generation. By the end of their lives their major contributions have been incorporated into the fabric of science and are neatly packaged in text books and review articles. The often fumbling approach to the new idea is tedious to read and is in fact not much read until it becomes 'history' a hundred years later. Who now buys Rutherford's 'Collected Works'? I have never seen them outside a library.

Szilard's book is an exception, it is enthralling, it brings back the memory of a great man and a good friend; it even magnifies him, or at any rate makes him seem his real size, which we had forgotten. This is only the first of two volumes; it contains his scientific papers and his patents, the second volume will contain the political and literary work.

The book opens with the thermodynamic papers of the 1920s, including one that finally exorcises Maxwell's Demon which had haunted physics for 50 years. Two papers on X-rays in crystals come next, they are not of great consequence and it was only in 1933, when he left Germany and came to England, that he turned to the things that we think of as his major contribution to science and civilization. He turned to nuclear physics and as early as 1934 had made a patent application for a neutron-propelled chain reaction for the generation of power and explosions. At that time the fission of uranium was unknown and the possibility of such a reaction depended on the discovery of a nuclear species that could be disintegrated by collision with a neutron and that would yield more than one neutron as a product. As soon as fission was discovered Szilard saw the possibilities and became one of the originators of nuclear technology. One of the most valuable parts of the book is the reproduction of patent specifications and of hitherto unpublished papers of the Manhattan Project. In a real sense Szilard invented the nuclear reactor and the bomb, he also took out patents for a host of other ideas including the cyclotron (in 1928) and a refrigerator (rather unexpectedly in collaboration with Albert Einstein).

After the war Szilard left physics and worked in biology; fourteen papers are reproduced here. His main interest however had shifted to the politics of the new situation in which several groups of men have the power to kill all the rest of us. For the documents of his efforts in this field we must wait for the second volume, but here the beginnings can be seen, mostly in his efforts in 1939–40 to prevent publication of the possibilities of making nuclear explosions.

Szilard wrote only 25 papers, but it would be hard to think of any scientist whose work has had more effect on our life and thoughts. He was also one of the two or three most intelligent men I have ever known. His 'Collected Works' are a contribution to the history of our time and a memorial to a very great man. As well as papers by Szilard they contain admirable commentaries by the leading experts; this is a work that everyone should read and is published at a price that most people can afford.

E. C. Bullard